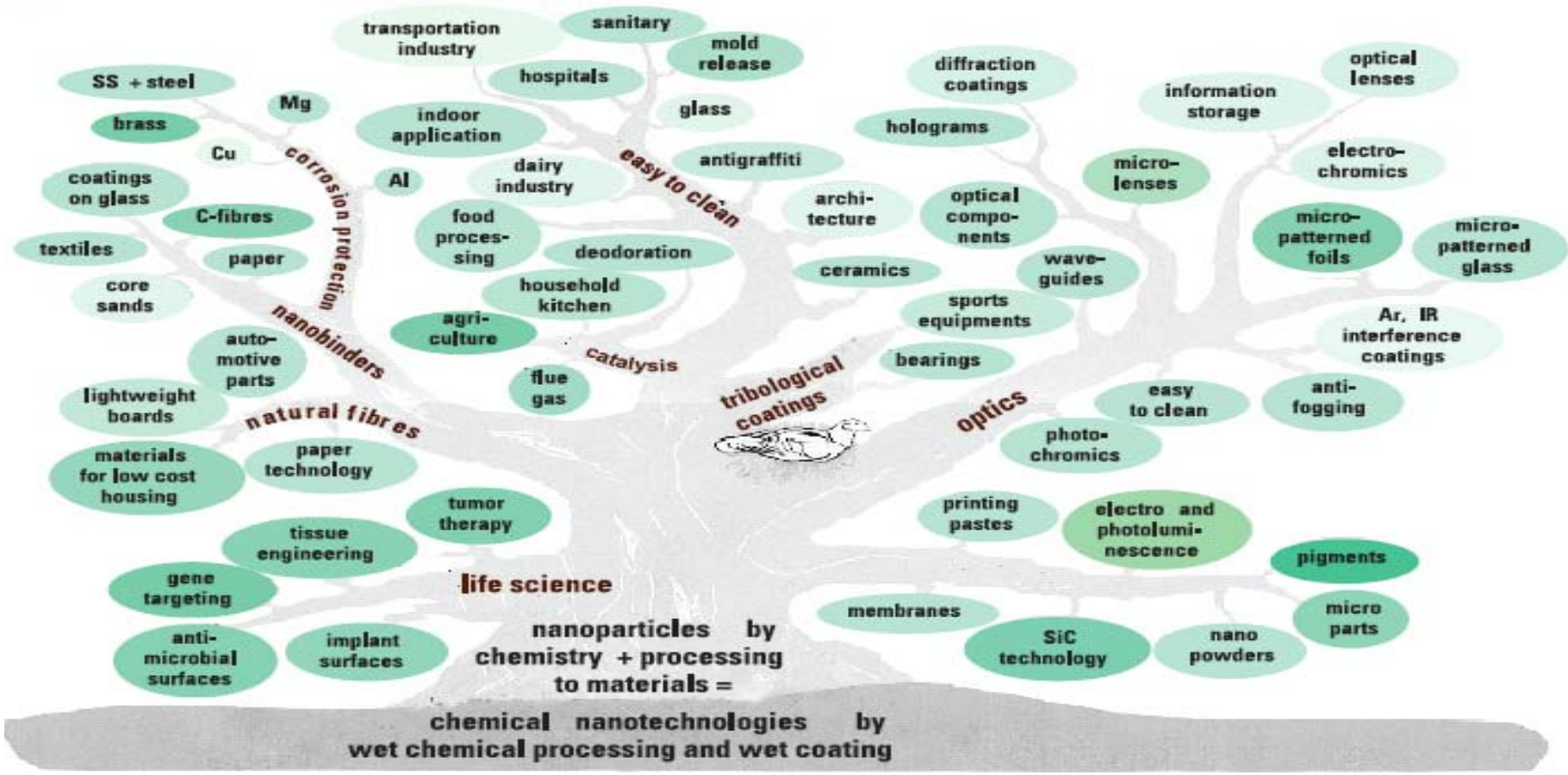
What is the National Nanotechnology Initiative (NNI)?

- A federal R&D initiative established to coordinate the multiagency efforts in nanoscale science, engineering, and technology

Broad Impact of Nanotechnology Expected

"The impact of nanotechnology on the health, wealth, and lives of people could be at least as significant as the combined influences of microelectronics, medical imaging, computer-aided engineering, and man-made polymers developed in this century."

National Nanotechnology Initiative: ***Leading to the Next Industrial Revolution***



Goals of the NNI

- **Maintain world-class R&D program aimed at realizing the full potential of nanotechnology**
- **Facilitate transfer of new technologies in products for economic growth, jobs, and other public benefit**
- **Develop educational resources, as skilled workforce, and the supporting infrastructure and tools for advanced nanotechnology**
- **Support responsible development of nanotechnology**

- **NNI homepage: http://www.nano.gov**

NIST VISION/ MISSION

- NIST will be the world leader in creating critical measurement solutions and promoting equitabel standards. To stimulate innovation, foster industrial competitiveness and improve quality of life.

- To promote US innovation and industrial competitiveness by advancing measurement science, standards and technology in ways that enhance economic security and improve our quality of life.

NNI participating Federal Agencies

- Department of Agriculture (USDA)
  - Forest Service
- Department of Commerce (DOC)
  - National Institute of Standards and Technology (NIST)
  - Patent and Trademark Office (PTO)
  - Bureau of Industry and Security
  - International Trade Commission (ITC)
- Department of Defense (DoD)
- Department of Education
- Department of Energy (DOE)
- Department of Homeland Security (DHS)
- Department of Justice (DOJ)
- Department of State (DOS)
- Department of Transportation (DOT)
- Department of Treasury (DOTreas)
- Department of Labor
- Consumer Product Safety Commission (CPSC)
- Environmental Protection Agency (EPA)
- Intelligence Technology Innovation Center (ITIC)
- National Aeronautics and Space Administration (NASA)
- National Institutes of Health (NIH)
  - Food and Drug Administration (FDA)
  - National Institute of Occupational Safety and Health (NIOSH)
- National Science Foundation (NSF)
- Nuclear Regulatory Commission (NRC)
- Office of Management and Budget (OMB)

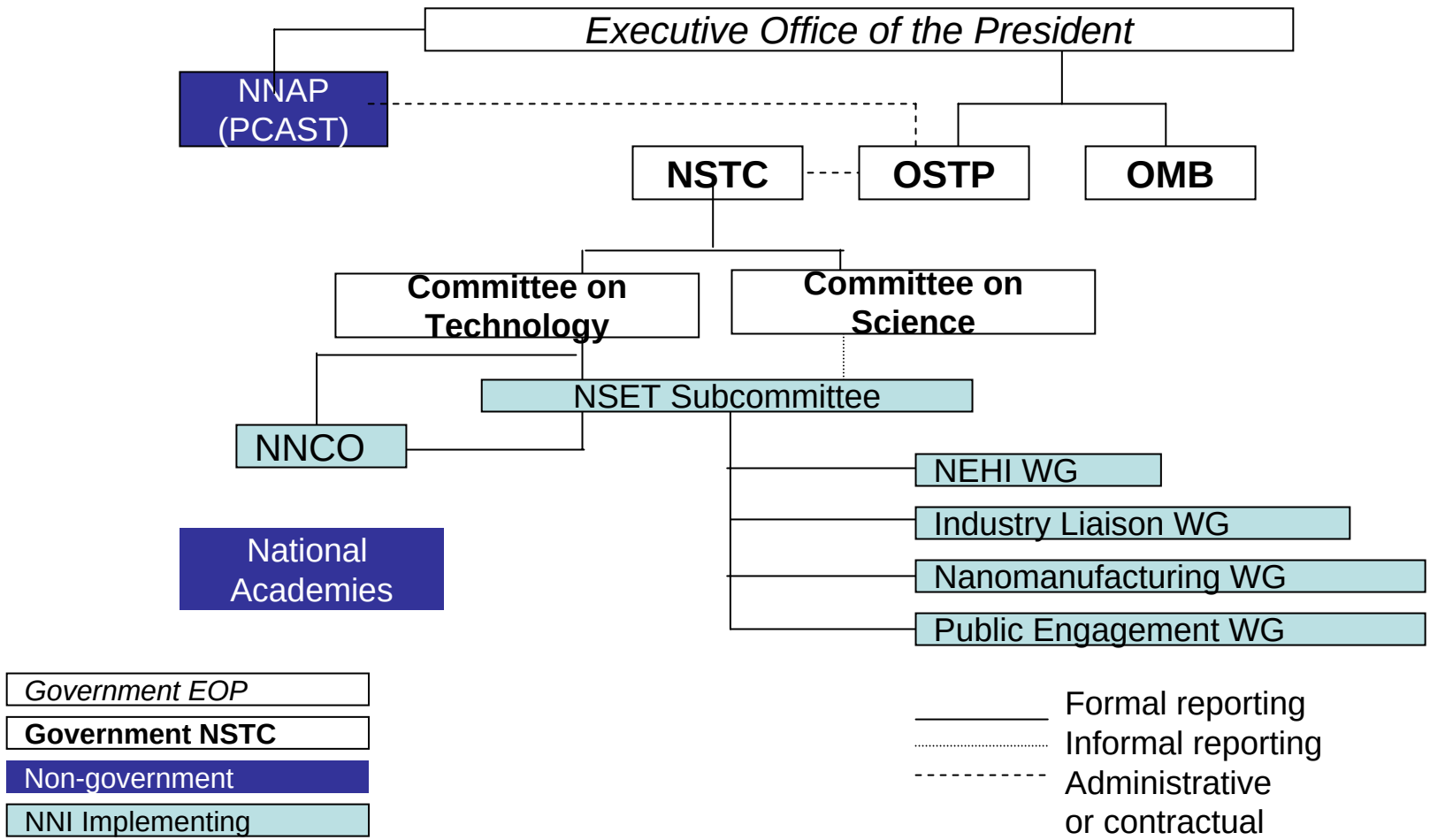
NRC Committee Membership [27]

James Williams, Ohio State University, Chair

A. Michael Andrews II, L3 Communications Corp.
Mark Cardillo, Camille and Henry Dreyfus Fdn.
Crystal Cunanan, Arbor Surgical Technologies
Peter Diamandis, X Prize Foundation
Paul Fleury, Yale University
Paul Germeraad, Intellectual Assets, Inc.
Alan Goldstein, Alfred University
Mary Good, University of Arkansas
Thomas Hartwick, Advisor
Maynard Holliday, Evolution Robotics
Richard Irving, Lakewood Village Community Church
Donald Levy, The University of Chicago
Harry Lipsitt, Wright State University
Bettie Sue Masters, University of Texas Health Science Center at San Antonio
Sonia E. Miller, Converging Technologies Bar Association
Ed Moran, Deloitte & Touche
David Mowery, UC, Berkeley
Cherry Murray, Lawrence Livermore National Laboratory ,Vice Chair
Kathleen Rest, Union of Concerned Scientists
Thomas Saponas, Agilent Technologies (retired)
Harvey Schadler, GE Corporate R&D Center (retired)
R. Paul Schaudies, Scientific Applications Int'l Corp.
Tsung-Tsan Su, Industrial Technology Research Institute (Taiwan)
Thomas Theis, IBM Watson Research Center
Mark Welland, University of Cambridge (UK)

National Materials Advisory Board Liason
Terry Lowe, Los Alamos National Laboratory

NNI Organizational Roles and Relationships



NSET Subcommittee member departments and agencies:

CPSC; DHS; DoD; DOE; DOC (BIS, NIST, USPTO, TA); DOJ; DOS; DOT; DOTreas; EPA; HHS (FDA, NIH, NIOSH); ITC; ITIC; NASA: NRC; NSF; USDA; DOEd

NNCO provides support to and works on behalf of the NSET Subcommittee; the NNCO Director reports to the White House Co-Chair of the Committee on Technology

Seven Program Component Areas (PCA's)

- **Fundamental nanoscale phenomena and processes**
- **Nanomaterials**
- **Nanoscale devices and systems**
- **Instrumentation research, metrology, and standards for nanotechnology**
- **Major research facilities and instrumentation acquisition**
- **Nanomanufacturing**
- **Societal dimensions (Education, EHS, & ELSI)**

NIST’s strong presence in NNI

- Largest % nano effort of all federal agencies
- NNCO Leader – Clayton Teague
- Representation on all five NSET Working Groups – Mike Postek
- Key role in NEHI with John Small

NIST PLAYS ACROSS THE BOARD

- Strongest overlap of NIST programs with NNI Program Component Areas

- NIST key roles and possibilities
  - Metrology
  - Standards
  - Environmental and health impacts

NNI Declares

- NIST -Is the lead agency on nanoscale mesurement science instrument calibrations, standard reference materials, and nanoscale physical and chemical properties standard reference data.

A Matter of Size ~ Recommendations

Support long term research by making new funds available that do not come at the expense of ongoing investment in the physical sciences and engineering.

Establish an independent advisory panel with specific operational expertise in nanoscale science and engineering to oversee the NSET Subcommittee, augmenting PCAST.

Develop means for consistent tracking and reporting of funds requested, authorized and expended annually across participating NNI federal agencies, using the present PCA taxonomy.

Establish NSET sub committee to study the feasibility of developing metrics to quantify the return to the US economy on the federal investment in nanotech R&D, including technology transfer and economic development of nanotechnology.*

Establish NSET working group on education and workforce development that engages the Dept's of Education and Labor as active participants.

Expand research on the ESH effects of nanotechnology including effects of exposure on humans, wildlife and other ecological receptors; characterize and manage risks associated with exposure.*

NIST's Core Competencies

- Measurement Science
- Rigorous traceability
- Development and use of standards
  - Responsible development/human condition

CNST – Magnet?

- Lessons from two other NIST user facilities – NCNR and JILA
- Coordination of CNST with 7 other OU's within NIST for SP, tracking, etc.
- SWOT and SP process continuing
- Engagement wit other NT players beyond NIST
- Unique interactions with small industry
- Metrics for success?

Standards

NIST participation on US and Int'l standards bodies-

- -Represented on 100 of 600 bodies
- -Key Chair Laurie Locascio of ANSI ESH Cmte.
- -Issue: how to influence standards [particularly internationally]

ESH Measurements Science and Standards Research for Nanotechnology

- Biggest under-exploited opportunity/need is in nano related ESH
- Locascio group impressive – just the tip of the iceberg [it's the right iceberg, though]
- US industry already becoming tentative
- If regulations precede science/data = trouble
- NIST uniquely qualified to develop standards for good and relevant data
- Greater role in orchestration with NIH, EPA, etc.
- Impact both + and – largest of all – on industry in particular
- Window is finite and probably short

Nanotechnology Subcommittee Mission

To provide strategic guidance for achieving US leadership in nanotechnology by advancing nanoscale measurement frontiers, and by championing standards and methods for the responsible development of nanotechnology in ways that enhance economic security and imporove our quality of life.

Next Steps

- VCAT subcommittees span the space – Nano/Bio/Info – a worthy experiment which increases content level of VCAT inputs.
- Evolve shorter turn around advice cycle through:
  - Better understanding of SP process in three key areas of metrology, standards, ESH
  - Interim e- and phone conferences to develop specific strategic issues for VCAT meetings
  - Coordinate with other subcommmittees
  - Format for interim feedbcks to NIST/other SC's?